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EVALUATION OF THE CALIFORNIA MARINE MAMMAL STRANDING NETWORK AS A MANAGEMENT TOOL BASED ON RECORDS FOR 1983 AND 1984

by
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Evaluation of The California Marine Mammal Stranding Network as a Management Tool Based on Records for 1983 and 1984

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INTRODUCTION

The Southwest Region (SWR) of the National Marine Fisheries Service (NMFS), along with a variety of educational institutions, scientific organizations, and municipal agencies cooperate in the operation of a statewide network designed to report and respond to marine mammal strandings on the coast of California. Under the authority of the Marine Mammal Protection Act, the NMFS has taken a lead role in organizing the California Marine Mammal Stranding Network (CMMSN), has delegated authority to participate in the handling of stranded marine mammals to various groups, and has served as a repository for reports of stranding events.

The purpose of this report is to evaluate the effectiveness of the CMMSN as a management tool based on data submitted to the NMFS for years 1983 and 1984. This report discusses the strengths and weaknesses of the data collected by the CMMSN and presents recommendations concerning the status and organization of the network. Topics of particular interest to management include: the potential for using these data to monitor incidental mortality of marine mammals in commercial fisheries, the potential effectiveness of network collected data in describing the epidemiology of disease in coastal marine mammal populations, and the identification of any other benefits to management from the stranding network.

Background - Context of data collection

Prior to 1972, information on California marine mammal strandings was collected on a local level by scientists affiliated with a few educational institutions and museums. Stranding events occasionally were summarized or referred to in the published literature. After the passage of the Marine Mammal Protection Act in 1972 and publication of implementing regulations in 1973, the NMFS and California Department of Fish and Game (CDFG) began to collect California coast-wide information concerning marine mammal stranding events. At that time, these agencies developed a marine mammal report form (Appendix I). Between 1973 and 1980 informal contacts were developed within local areas to respond to strandings and to arrange for disposal or collection of stranded animals. However, authority to respond was not clearly identified or delegated by management agencies. It often was unclear who had the responsibility for report submission. Hence, coastwide report files were incomplete.

In response to requests from municipalities, scientific groups, and the public, the NMFS and CDFG held two meetings in 1980 to formalize a statewide stranding network. In 1982 organizational meetings were held throughout the State to explain

the sequence of response, to introduce a new report form (Appendix II), and to identify responsibilities of Network participation. The history and organization of the Network is explained in greater detail in the California Marine Mammal Stranding Network Directory (NMFS 1982) and in the Annual Reports to Congress for the Marine Mammal Protection Act (NOAA 1983, 1984, 1985).

Scope

This review includes all reports of stranded pinnipeds and cetaceans on the mainland coast of California submitted to the SWR by the CMMSN for the calendar years 1983 and 1984.

The following definition of stranding is provided to all network members:

> Any dead marine mammal on a beach or floating nearshore is considered to be "stranded". A marine mammal out of its element is considered to be "stranded". Therefore, any live cetacean on the beach is considered to be "stranded". Aside from regular haulout or breeding sites, live pinnipeds that haulout on coastal California beaches subject to frequent or habitual human use are considered to be stranded. Pinnipeds hauled out in more remote areas require a 24-48 hour observation period before being considered to be stranded. This allows an animal time to rest and to return to the sea on its own.

A stranding report is required (50 CFR 216.22) whenever a participant engages in an activity that results in the disturbance of a live stranded animal, or the handling, removal or transport of a marine mammal either alive or dead. While all participants are required to submit reports, the actual number of stranding events is likely to be greater than reported.

CMMSN DATA MANAGEMENT METHODS

Stranding reports generated by the network are compiled from numerous sources throughout California. Reports are received, verified and edited by the Network Coordinator at the SWR, Terminal Island, California. Where there are questions concerning data on the report form, the Coordinator usually obtains resolutions by contacting the reporter. A complete report is entered into a file on a mainframe computer contracted by the National Oceanic and Atmospheric Administration. The following results were obtained through attribute searches and

were often cross-checked through selection of different variables.

RESULTS AND DISCUSSION

Overview of stranding data

The CMMSN reported 2,404 strandings in 1983 and 959 in 1984. The category breakdown was:

Category	1983	1984	Totals
Pinnipeds	2,286	850	3,136
Cetaceans	117	108	225
Unidentified marine mammal	1	1	2
	2,404	959	3,363

Six species of pinnipeds and at least 18 species of cetaceans were reported stranded on the California mainland coast during this two year period (Tables 1-4). Strandings were reported from all California coastal counties except Napa (including those in San Francisco Bay; Table 5). There was a substantial difference in the number of pinniped strandings between years (above) and on a geographic basis (Table 5, and Figure 1). The frequency of cetacean strandings by county was similar for both years.

Various types of stranding events were reported by the CMMSN; these were grouped into the categories of "stranding", "human related" (e.g., automobile, clubbed, shot, etc.), "incidental fishing mortality" and miscellaneous for this analysis (e.g. Table 12).

Pinnipeds

Pinniped stranding data documented expected seasonal patterns with most strandings occurring during the winter and early spring periods of both years (Tables 1 and 2; Figures 2A-2B). The high numbers of pinniped strandings reported for February-June 1983 probably can be attributed to the severe stormy weather of the "El Niño" winter. Correspondingly, the winter of 1984 was rather mild and the incidence of pinniped strandings was much lower.

The late summer 1984 increase in California sea lion strandings can be related to the occurrence of an outbreak of Leptospira pomona, a bacterium that attacks the central nervous system of mammals often resulting in a high rate of mortality.

The low number of strandings in northern California (District 1) reported in both years may be a reflection of low effort due to a remote inaccessible coastline rather than an actual paucity of pinnipeds on the beach.

Tagging programs conducted by the NMFS and other institutions, and the related data collected through the stranding network, provide information that is factored into population assessments and provide a means to monitor animals previously habituated to humans while in the rehabilitation process. NMFS management uses this information to monitor interactions of rehabilitated animals with human activities and to assess the effectiveness of the rehabilitation process. A total of 516 reports of tagged pinnipeds were submitted by the CMMSN during 1983 and 1984. The rehabilitation center based pinniped tagging program will be examined in a future report.

Cetaceans

Similar numbers of cetaceans stranded throughout both years with 117 reported stranded in 1983 and 108 in 1984 (Tables 3 and 4). When cetaceans are found stranded alive, they are taken to a rehabilitation center for treatment. Of the 17 cetaceans reported as live strandings, only one survived in captivity longer than a few days. Cetaceans found along the California coast generally were stranded within their expected geographic ranges. However, the distribution of harbor porpoise strandings was clumped and skewed independently of the expected typical geographic distribution.

Coast Coverage

Currently, effort only can be defined as the submission of stranding reports by network members. With the exception of a couple of localized reporting areas, effort is not measurable in terms of the number of strandings per mile per day because defined coastal areas are rarely searched on a regular basis.

Interest in a stranded marine mammal varies according to the mission of the person encountering the stranding, the species and condition of the animal, whether or not the animal bears a tag, and the proximity of the stranding to centers of human population. Animal welfare groups or those organizations collecting information from a stranding are most likely to report an event.

"Higher interest" strandings include live and dead cetaceans and live pinnipeds. The stranding data is most complete for cetaceans because of their high public and scientific interest and their size (= visibility). The response of the network is the most incomplete for dead pinnipeds; therefore the data are "inadequate" for this group, particularly the northern California

district. Anyone making generalizations or attempting to draw conclusions from CMMSN data will need to recognize this deficiency and qualify their findings appropriately. These data should not be considered as an absolute measure of stranding frequency but are useful as a relative annual index of strandings as long as the variation in geographic effort is recognized.

To summarize, the distribution of network members is uneven throughout the State. The likelihood of eventual report submission varies depending on the type and condition of animal stranding and geographic location. It may be possible to improve reporting in remote coastal sections by working more closely with military base biologists, park rangers, U.S. Coast Guard patrol personnel, and the hiking public that frequent these areas and often serve as contacts for local participants.

Several stretches of the coast are examined thoroughly for strandings in a consistent manner. These include discrete stretches of Point Reyes National Seashore, Golden Gate National Recreational Area, San Mateo County, Orange County and Camp Pendleton (San Diego County). Programs operated in these areas could be developed to describe and monitor stranding trends that have a defined unit of effort. These data could be used to develop a reliable index of local stranding events which could be compared on a year to year basis (e.g. number of strandings/mile/month). Such long term monitoring could provide more accurate information on localized changes in stranding rates and to relate fluctuations to specific events such as increases in incidental mortality from nearshore fisheries. Currently, the scope of these programs is extremely limited and the resulting data should not be substituted for overall coastal data collection.

The NMFS made a considerable effort to contact as many beach front management agencies and interested groups as possible in 1982 and early 1983. This may have increased effort over pre-1982 levels and therefore caused an increase in the number of reports submitted. However, changes in effort due to NMFS input were likely moderated to some degree by the stability of reporting personnel. Therefore, we recommend maintaining periodic contact with the network through mailings and by telephone in order to maintain a status quo in report submission.

Periodic contact should be directed toward improving the quality of stranding reports by providing educational materials (to ensure accurate species identification), notification of small changes in network organization (update of directory for phone numbers, new listings, etc.), and feedback of collated stranding data to network participants. Such contact also will probably result in increased use of the data base.

Management value of the data

Stranding data may serve to alert management to outbreaks of disease. For example, in late summer 1984, northern area rehabilitation centers notified the NMFS that increasing numbers of stranded California sea lions, primarily males, were being admitted. The centers attributed the strandings to an outbreak of the bacterial disease Leptospirosis based on gross necropsy, histopathology, hematology, bacteriology, and observations of symptoms (Roletto and Harvey 1985). Stranding data presented in Tables (2,6,7, and 8 and Figures 3A and 3B) reflect these increases. In general, however, the information currently being collected through the stranding network does not permit measurement of the effect of an epidemic on the population or allow for a detailed description of the epidemiology of a disease within a population or throughout the State. Most stranding reports do not identify the "cause" of a stranding - either because this information is not collected (e.g. necropsies may not be performed, blood samples are not taken) or because this information is not included on the report.

The stranding data has potential use as a tool for alerting management to changes in incidental mortality of marine mammals in some coastal fisheries. The CMMSN reported between 42 and 50 harbor porpoise strandings per year during July - September of 1983 and 1984, primarily in Marin, San Francisco and San Mateo counties (Table 9). The frequency of these strandings were an order of magnitude larger than the stranding rate for harbor porpoise reported for the period 1963-1979 (as reported by D. Ainely in a statement to the Department of Fish and Game, 5 August 1983). This increase in harbor porpoise strandings correlates with an increased effort in gill and trammel net fisheries for California halibut.

Direct evidence of harbor porpoise mortalities due to gill net entanglement was provided by the CMMSN (Table 9C). However, an analysis of the information is not possible for estimating total mortality or monitoring the effect of the mortality on the population because the proportion of the mortality that strands is unknown.

Data from the stranding records are insufficient to characterize the composition of the kill because (1) the sample size is small, (2) age and sex descriptions are often listed as "unknown", and (3) reported ages are assigned to a rather arbitary set of classes based on a subjective determination by the reporter (Table 10).

Stranding data can be used as an early warning system if the records are kept current and are monitored periodically. Once alerted to changes in stranding events, management can respond as appropriate. For example, reports of increasing (relative to

prior records) numbers of stranded harbor porpoise alerted the NMFS and CDFG to a potential fisheries related problem. The agencies responded by initiating surveys of the harbor porpoise populations (eg. Dohl 1984) and to more closely monitor and reduce incidental mortality of harbor porpoise in coastal gillnet fisheries (e.g. Hanan and Diamond In prep). The NMFS also began to work with network participants and scientists to collect more extensive information from the stranded animals. In the harbor porpoise case, participants were solicited to collect and forward necropsy and life history data (sex, gonads, teeth) to the NMFS from all animals stranded in the subject area. This information is contributing to the development of age and sex structure estimates of the mortalities.

The early identification of regional epizootics and fluctuations in marine mammal distribution through stranding reports can help scientists and managers to interpret population trends. In addition, such an early warning system can assist rehabilitation centers to prepare for the treatment of animals experiencing an epizootic.

Scientific value of the stranding program

Information collected by CMMSN participants is used by a variety of educational and conservation organizations. Two categories of information are sought: (1) data concerning the occurrence of the stranding event and (2) physical, medical, or other aspects of the stranded animal(s). The CMMSN files have been searched for "Category One" information for several species, including: northern fur seals, gray whales, harbor porpoise, white-sided dolphin, bottlenose dolphin, and several species of beaked whales. The information obtained has contributed to publications concerning distribution of the particular species (Leatherwood and Walker 1982, Leatherwood et al. 1984, 1982, 1980, 1975, Rolletto and Webber in prep., Stein and Herder in prep., Walker et al. 1984) and in relation to incidental mortality with fisheries (testimony of Ainely 1983, Lecky in prep.).

In general, biologists seeking "Category Two" data use the SWR maintained CMMSN files to locate various collections where particular stranded animals are held. The investigators may then examine specimen material at the holding institutions. (Institutions are required through their NMFS letter of authorization to maintain material in collections currated according to guidelines established by several professional organizations.) This material contributes to estimates of life history parameters (e.g., age at first reproduction, fecundity) which are factored into population models, studies of comparative anatomy which contribute to the resolution of taxonomic relationships (e.g. Mead et al. 1982 on Mesoplodon), and in work

leading to identification of various stocks within a species (e.g., Walker 1981 on Tursiops).

Data for the past two years have been entered and are now maintained on a timeshare mainframe computer under a contract issued for NMFS-wide use. The costs incurred to maintain and use the timeshare system (approximately $1.5K/year) are paid for by NMFS Headquarters as part of a Service-wide data management system.

Approximately 5.0 staff months of Regional time were required to open and program the STRAND files and to enter and edit the data considered by this report. The time required for data entry per report has shortened as the system has been streamlined. It may be possible to further reduce time and costs associated with data entry by simplifying the reporting form. Accelerating the data entry process would make it easier to maintain up-to-date files.

Having computerized information readily available is likely to result in increased requests for stranding information. The extensive data files for a variety of information, which previously could only be obtained through a long, hand search process, can now be accessed readily. Agency actions to publicize the existence and availability of the CMMSN data in our computer also could result in increased use of the data. The primary costs incurred by these actions would be staff time.

On an annual basis the maximum staff time required to continue NMFS management of the CMMSN at current levels is projected as follows: 3.0 staff months (incurred intermittently) for Network coordination, 2.0 staff months for data entry, and 2.0 staff months for data analysis and report generation, depending upon the degree to which the recommendations in this report are implemented.

Stranding data could be used more fully by participating institutions if initial reports were more detailed and/or complete. The value of these reports could increase considerably if additional life history information (e.g., sex, morphometrics, gonads, stomachs, teeth, etc.) was collected, analyzed and noted on each stranding form. At present, the NMFS will continue to encourage and facilitate collection of this information on a voluntary basis. In specific high priority cases (e.g. harbor porpoise), organizations or individuals may be contracted to collect specific samples in the field.

Organization and network management

Based on the quantity and quality of the reports received, participants appear to have a clear understanding of the locales and types of strandings for which they are responsible.

Duplication of effort has been minimized, and considerable useful information currently is gathered for little effort. In fact, it takes more staff hours to enter and analyze the information than to obtain it.

While there are some gaps and weaknesses in the reporting system, it is unlikely that a significant increase in NMFS staff involvement would increase the quantity of the data. Periodic reminders and feedback to the CMMSN will maintain data submission and should be continued. The quality of the data is likely to be improved through this feedback as reporters see how their reports are used and how they compare with others from other areas. The quality of pinniped species identification could be improved considerably by the preparation and dissemination of a brochure similar to the gray whale brochure.

Reducing the present level of effort would not result in an immediate decrease in data quantity and quality as the network is organized to run with minimal guidance from NMFS. A reduction in NMFS effort would likely result in an eventual weakening of network cooperation and a reduction in the number of stranding reports received.

Management benefit of the rehabilitation process

In 1984, 510 pinnipeds were reported to strand alive. Of these, 492 were admitted to rehabilitation centers. Of the 1,518 pinnipeds reported as live strandings in 1983, 1,406 were admitted. Approximately 25% of those treated were successfully rehabilitated and released (123 in 1984, 337 in 1983). In both years, rehabilitated, but unreleaseable, animals were transferred to public display facilities or research laboratories (8 in 1984, 15 in 1983).

The rehabilitation center program responds to frequent public concern for the welfare of individual animals. Volunteers working in this program provide a valuable service to local animal control services and other coastal land management agencies by removing "problem" animals from public areas. In some cases, center responses serve to protect public health and safety. These responses reduce the frequency with which local NMFS offices need to respond to such events. The volunteer receives training in animal care and handling. Recently some of these trained individuals have began to work in NMFS research programs. Several rehabilitation centers have developed active health care research programs. These programs are providing new information concerning medical and veterinary aspects of the animal's biology.

Rehabilitated animals are fulfilling the requests for specimens for public display and in some cases research. These transfers have reduced the need to remove animals from the

population in the wild. Research conducted on animals still in treatment has benefited management and research programs of the NMFS. For example, the effects of lithium chloride, a proposed deterrent of sea lions from sportfishing vessels, was tested under an NMFS contract that used animals in a rehabilitation center.

Because animals in rehabilitation programs can become habituated to humans, management is concerned about the potential for these animals to interact with commercial and sport fisheries. To examine this problem, a tagging program for released animals was initiated in late 1983. A report will be prepared in 1986 to examine interactions, movements, and survivorship of these animals.

CONCLUSIONS AND RECOMMENDATIONS

1. In certain instances management may be able to use data collected by the CMMSN as an early warning system of anomalous events in the wild (e.g. harbor porpoise/gillnet interactions, and the recent Leptospirosis outbreak).

Because of this kind of benefit, the NMFS should continue to maintain stranding files so that management can be alerted to anomalies in stranding frequencies.

2. The stranding data are limited because units of effort can not be described, reporting varies on a geographic basis, and some basic information is not collected or reported with consistency. Therefore, these data can not accurately describe specific cause and effect relationships (e.g. attribute mortality to a specific fishery) or access the impact of such events to a population.

In order to maintain the flow of useful information and to improve the quality of the data submitted, the NMFS should:

a. Contact CMMSN members on an annual or biannual basis to disseminate summaries of data received, to upgrade the Directory, and to make information available which will improve the quality of submitted data.

b. Revise the stranding form to make it more "user friendly" for both field personnel and data entry staff.

c. Encourage the improved collection of life history information for cetaceans and tagged pinnipeds.

d. Develop a brochure useful to the CMMSN for making accurate identification of pinnipeds.

e. Enter and analyze the 1974-1982 backlog of stranding information on a prioritized basis: cetaceans, tagged pinnipeds, remaining pinnipeds.

f. Publish compendia of stranding data as appropriate.

g. Publicize the availability of the CMMSN data base and provide this information to those requesting it.

ACKNOWLEDGEMENTS

Data used in this report was collected by the California Marine Mammal Stranding Network. Over 200 organizations and their personnel, most of them volunteers, work in the aid and study of stranded marine mammals. The NMFS appreciates the dedication and the long hours given by these people.

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Table 1. Numbers of pinnipeds reported stranded by month by species in 1983.*

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	SPECIES TOTAL/YR
Z. californianus	81	165	326	242	242	178	71	100	87	71	82	105	1,750
P. vitulina	3	9	29	55	39	39	18	13	7	3	8	9	232
M. angustirostris	24	27	49	52	28	20	11	9	4	9	5	3	241
C. ursinus		1	2	3	2	1	2	1	1	3	3		19
E. jubatus			1	2			1	2	1		2	1	10
A. townsendi													0
"Miscellaneous"	1	3	1	9	2	5	2	1	2	2	3	3	34
MONTHLY TOTALS	109	205	408	363	313	243	105	126	102	88	103	121	2,286

Table 2. Numbers of pinnipeds reported stranded by month by species in 1984.*

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	SPECIES TOTAL/YR
Z. californianus	55	50	57	45	25	13	39	101	92	88	35	24	624
P. vitulina	3	8	14	19	10	19	7	10	3	4	3	3	103
M. angustirostris	8	4	17	24	14	3	2	8	3	5	7	4	99
C. ursinus							1					1	2
E. jubatus	1			1			1		2	3			8
A. townsendi					1								1
"Miscellaneous"		3	2		1	2			1	3	1		13
MONTHLY TOTALS	67	65	90	89	51	37	50	119	101	103	46	32	850

* Actual number stranded likely to be higher, especially in San Diego and Santa Cruz Counties. See text.

Table 3. Cetaceans reported stranded to the NMFS by the CMMSN in 1983.

Common Name - Species	Number Reported	Percent Of Total
Harbor porpoise - *Phocoena phocoena*	50	42.7
Common dolphin - *Delphinus delphis*	13	11.1
Bottlenose dolphin - *Tursiops truncatus*	9	7.7
Gray whale - *Eschrichtius robustus*	8	6.8
Pacific white-sided dolphin - *Lagenorhynchus obliquidens*	8	6.8
Striped dolphin - *Stenella coeruleoalba*	3	2.6
Cuvier's beaked whale - *Ziphius cavirostris*	2	1.8
Humpback whale - *Megaptera novaeangliae*	2	1.8
Rough-toothed dolphin - *Steno bredanensis*	2	1.8
Sperm whale - *Physeter macrocephalus*	2	1.8
Dall's porpoise - *Phocoenoides dalli*	1	.8
Fin whale - *Balaenoptera physalus*	1	.8
Minke whale - *Balaenoptera acutorostrata*	1	.8
Pygmy sperm whale - *Kogia breviceps*	1	.8
Short-finned pilot whale - *Globicephala macrorhynchus*	1	.8
Spinner dolphin - *Stenella longirostris*	1	.8
Unidentified cetaceans	12	10.3
TOTALS	117	100.0

Table 4. Cetaceans reported stranded to the NMFS by the CMMSN in 1984.

Common Name - Species	Number Reported	Percent Of Total
Harbor porpoise - *Phocoena phocoena*	42	38.9
Common Dolphin - *Delphinus delphis*	23	21.3
Gray whale - *Eschrichtius robustus*	13	12.0
Pacific white-sided dolphin - *Lagenorhynchus obliquidens*	8	7.4
Bottlenose dolphin - *Tursiops truncatus*	4	3.7
Dall's porpoise - *Phocoenoides dalli*	3	2.8
Pygmy sperm whale - *Kogia breviceps*	3	2.8
Cuvier's beaked whale - *Ziphius cavirostris*	2	1.9
Sperm whale - *Physeter macrocephalus*	2	1.9
Blainville's beaked whale - *Mesoplodon densirostris*	1	.9
Blue whale - *Balaenoptera musculus*	1	.9
Hubb's beaked whale - *Mesoplodon carlhubbsi*	1	.9
Minke whale - *Balaenoptera acutorostrata*	1	.9
Unidentified beaked whale - *Mesoplodon* spp.	1	.9
Unidentified cetaceans	3	2.8
TOTALS	108	100.0

Table 5. Strandings reported by county and summed by district.

COUNTY	1983			1984		
	PINNIPEDS	CETACEANS	UNIDENTIFIED	PINNIPEDS	CETACEANS	UNIDENTIFIED
Del Norte	2	1		6	2	
Humboldt	23	2		38	8	
Mendocino	2	1		12	1	
DISTRICT 1	27	4	0	56	11	0
Sonoma	47	1		48	4	
Marin	139	19		92	15	
Napa						
Solano				1		
San Francisco	20	2		33	12	
Contra Costa	1			2		
San Joaquin	1					
Alameda	4	1		9		
Santa Clara				1		
San Mateo	191	35		114	13	
DISTRICT 2	403	58	0	300	44	0
Santa Cruz	73@	2		47@	5	
Monterey	163	2		87	4	
DISTRICT 3	236	4	0	134	9	0
San Luis Obispo	146	6		59	9	
Santa Barbara	59	2		19	9	
Ventura	93	2		12	5	
DISTRICT 4	298	10	0	90	23	0
Los Angeles	654	7	1	129	4	1
Orange	442	23		77	10	
DISTRICT 5	1,096	31	1	206	14	1
DISTRICT 6 (San Diego)	226@	11	0	64@	7	0
TOTALS	2,286	117	1	850	108	1

@ Known incomplete reporting or inconsistent recovery effort. See text.

Table 6. Sex and age classes of Zalophus californianus reported stranded by the CMMSN - all types of occurrences. Data incomplete for San Diego and Santa Cruz counties - see text.

A. Sex

Sex	1983 N	1983 %	1984 N	1984 %
Males	582	33.3	369	59.1
Females	547	31.2	116	18.6
Unknown	621	35.5	139	22.3
TOTAL	1,750	100.0	624	100.0

B. Age structure 1983

Age	Males N	Males %	Females N	Females %	TOTALS* N	TOTALS* %
Pups	79	13.6	101	18.5	180	15.9
Yearlings	121	20.8	63	11.5	184	16.3
"Others"	82	14.1	59	10.8	141	12.5
Adult	47	8.1	52	9.5	99	8.8
Unknown	253	43.5	272	49.7	525	46.5
TOTALS	582	100.1	547	100.0	1,129	100.0

* Does not include 621 individuals of undetermined sex.

C. Age Structure 1984

Age	Males N	Males %	Females N	Females %	TOTALS@ N	TOTALS@ %
Pups	12	3.3	5	4.3	17	3.5
Yearlings	36	9.8	16	13.8	52	10.7
"Others"	198	53.7	31	26.7	229	48.2
Adult	76	20.6	26	22.4	102	21.0
Unknown	47	12.7	38	32.8	85	17.5
TOTALS	369	100.1	116	100.0	485	99.9

@ Does not include 139 individuals of undetermined sex.

Table 7. Distribution of Zalophus californianus strandings reported by the CMMSN by sex and month. (Data incomplete for San Diego and Santa Cruz counties, see text.)

Month	Sex@	1983 N	1983 %	1984 N	1984 %
January	F	32	39.5	17	30.9
	M	36	44.4	11	20.0
	U	13	16.0	27	49.1
February	F	63	38.2	19	38.0
	M	73	44.2	17	34.0
	U	29	17.6	14	28.0
March	F	128	39.3	15	26.3
	M	112	34.4	15	26.3
	U	86	26.4	27	47.4
April	F	61	25.2	13	28.9
	M	66	27.3	17	37.8
	U	115	47.5	15	33.3
May	F	62	25.6	6	24.0
	M	76	31.4	9	36.0
	U	104	43.0	10	40.0
June	F	29	16.3	2	15.4
	M	50	28.1	8	61.5
	U	99	55.6	3	23.1
July	F	23	32.4	6	15.4
	M	29	40.8	28	71.8
	U	19	26.8	5	12.8
August	F	23	23.0	8	7.9
	M	44	44.0	87	86.1
	U	33	33.0	6	5.9
September	F	23	26.4	10	10.9
	M	26	29.9	77	83.7
	U	38	43.7	5	5.4
October	F	24	33.8	9	10.2
	M	26	36.6	60	68.2
	U	21	29.6	19	21.6
November	F	38	46.3	5	14.3
	M	19	23.2	25	71.4
	U	25	30.5	5	14.3
December	F	41	39.0	6	25.0
	M	25	23.8	15	62.5
	U	39	37.1	3	12.5

@ M=Male, F=Female, U=Unknown

Table 8. Male Zalophus californianus strandings reported by the CMMSN.

A. Division of stranding events by county.

County of Stranding	1983	1984
Del Norte	0	1
Humboldt	5	24
Mendocino	2	6
Sonoma	13	32
Marin	20	69
Solano	0	1
San Francisco	11	25
Contra Costa	1	2
San Joaquin	1	0
Alameda	2	9
Santa Clara	0	1
San Mateo	80	64
Santa Cruz	38	25
Monterey	43	38
San Luis Obispo	35	8
Santa Barbara	22	5
Ventura	37	4
Los Angeles	163	31
Orange	31	4
San Diego	78	20
TOTALS	582	369

* Known incomplete records received or inconsistent recovery effort.

B. Division of stranding events by month.

Month of Stranding	1983		1984	
	N	%	N	%
January	36	6.2	11	3.0
February	73	12.5	17	4.6
March	112	19.2	15	4.1
April	66	11.3	17	4.6
May	76	13.1	9	2.4
June	50	8.6	8	2.2
July	29	5.0	28	7.6
August	44	7.6	87	23.6
September	26	4.5	77	20.9
October	26	4.5	60	16.3
November	19	3.3	25	6.8
December	25	4.3	15	4.1
TOTALS	582	100.1	369	100.2

Table 8. Continued

C. The number of male Zalophus californianus strandings reported by the CMMSN for selected northern and southern California areas by season. See text for definitions and discussion.

		South	North
1983	Winter	138	43
	Late Summer	23	46
1984	Winter	21	6
	Late Summer	4	129

Table 9. Strandings of Phocoena phocoena reported by the CMMSN.

A. Division by county.

County of Stranding	1983	1984	TOTALS
Del Norte	0	2	2
Humboldt	2	4	6
Mendocino	0	0	0
Sonoma	0	1	1
Marin	13	12	25
Solano	0	0	0
San Francisco	2	10	12
Contra Costa	0	0	0
San Joaquin	0	0	0
Alameda	0	0	0
Santa Clara	0	0	0
San Mateo	30	8	38
Santa Cruz	1	4	4
Monterey	0	0	0
San Luis Obispo	1	1	2
Santa Barbara	1	0	1
Ventura	0	0	0
Los Angeles	0	0	0
Orange	0	0	0
San Diego	0	0	0
TOTALS	50	42	92

B. Division by month.

Month of Stranding	1983	1984	TOTALS
January	0	0	0
February	0	1	1
March	1	1	2
April	1	1	2
May	0	1	1
June	0	1	1
July	8	8	16
August	11	24	35
September	21	1	22
October	6	3	9
November	1	1	2
December	1	0	1
TOTALS	50	42	90

C. Type of stranding occurrence

	1983		1984	
Category	N	%	N	%
Stranding cause unknown	34	68.0	19	45.2
Human related	0	0.0	1	2.4
Human related - shot	2	4.0	0	0.0
Human related - shot?	0	0.0	1	2.4
Incidental catch - gillnet	4	8.0	19	45.2
Incidental catch - gillnet?	10	20.0	2	4.8
TOTALS	50	100.0	42	100.0

Table 10. Age and sex classes of Phocoena phocoena reported by the CMMSN for all types of stranding occurrences.

A. 1983

Class	Male	Female	Unknown	Total	%
Adult	7	8	1	16	32
"Others"*	8	4	6	18	36
Calf	0	2	0	2	4
Unknown	3	1	10	14	28
TOTAL	18	15	17	50	100

B. 1984

Class	Male	Female	Unknown	Total	%
Adult	1	4	2	7	16.7
"Others"*	6	7	2	15	35.7
Calf	3	0	2	5	11.9
Unknown	3	5	7	15	35.7
TOTAL	13	16	13	42	100.0

C. 1983 and 1984 POOLED

Class	N	%
Adults	23	25%
"Others"	33	36%
Calves	7	8%
Unknown	29	31%
	92	100%

D. SEX

	1983		1984	
Sex	N	%	N	%
Females	15	30%	16	38%
Males	18	36%	13	31%
Unknown	17	34%	13	31%
TOTAL	50	100%	42	100%

* See text for definition

Table 11. Strandings of Eschrichtius robustus reported by the CMMSN.

A. Geographic distribution

County of Stranding	1983	1984	TOTALS
Del Norte	1	0	1
Humboldt	0	1	1
Mendocino	0	0	0
Sonoma	0	2	2
Marin	1	1	2
Solano	0	0	0
San Francisco	0	0	0
Contra Costa	0	0	0
San Joaquin	0	0	0
Alameda	0	0	0
Santa Clara	0	0	0
San Mateo	0	0	0
Santa Cruz	1	0	1
Monterey	0	0	0
San Luis Obispo	0	2	2
Santa Barbara	0	0	0
Ventura	0	2	2
Los Angeles	3	1	4
Orange	1	4	5
San Diego	1	0	1
TOTALS	8	13	21

B. Time of year

Month of Stranding	1983	1984	TOTALS
January	1	0	1
February	0	8	8
March	0	1	1
April	3	0	3
May	2	2	4
June	0	1	1
July	0	0	0
August	0	0	0
September	0	0	0
October	0	0	0
November	0	1	1
December	2	0	2
TOTALS	8	13	21

C. Sex

	1983		1984	
Sex	N	%	N	%
Females	2	25	2	15.4
Males	4	50	4	30.7
Unknown	2	25	7	53.8
TOTALS	8	100	13	99.9

D. Age class

	1983		1984		Pooled	
Class	N	%	N	%	N	%
Adults	0	0.0	2	15.4	2	9.5
Others*	4	50.0	2	15.4	6	28.6
Calves	1	12.5	1	7.7	2	9.5
Unknown	3	37.5	8	61.5	11	52.4
TOTALS	8		13		21	

E. Type of stranding occurrence

	1983		1984		Pooled	
Category	N	%	N	%	N	%
Stranding	7	87.5	9	69.2	16	76.1
Human related-boat	0	0.0	1	7.7	1	4.8
Incidental catch-gillnet	1	12.5	3	23.1	4	19.1
TOTALS	8	100.0	13	100.0	21	100.0

* Includes individuals identified as juvenile, young adult and age "1".

Table 12. Stranding events and final disposition of live animals entered into rehabilitation centers.

A. Pooled Data for both years

Stranding event category	N
Strandings	3,179
Human related	1,140
Incidental fishing mortality	57
Miscellaneous	20

B. Disposition of live stranded animals

Dispositions		1983	1984
Number of live stranded pinnipeds		1,518	510
that were:	Admitted to rehabilitation centers	1,406	492
	Admitted that died	960	297
	Euthanasia	2	11
	Transferred to public display or research	15	8
	No final disposition listed	43	49
	Presumably still held	49	4
	Released	337	123
	With tag	198	118
	Without tag	139	5

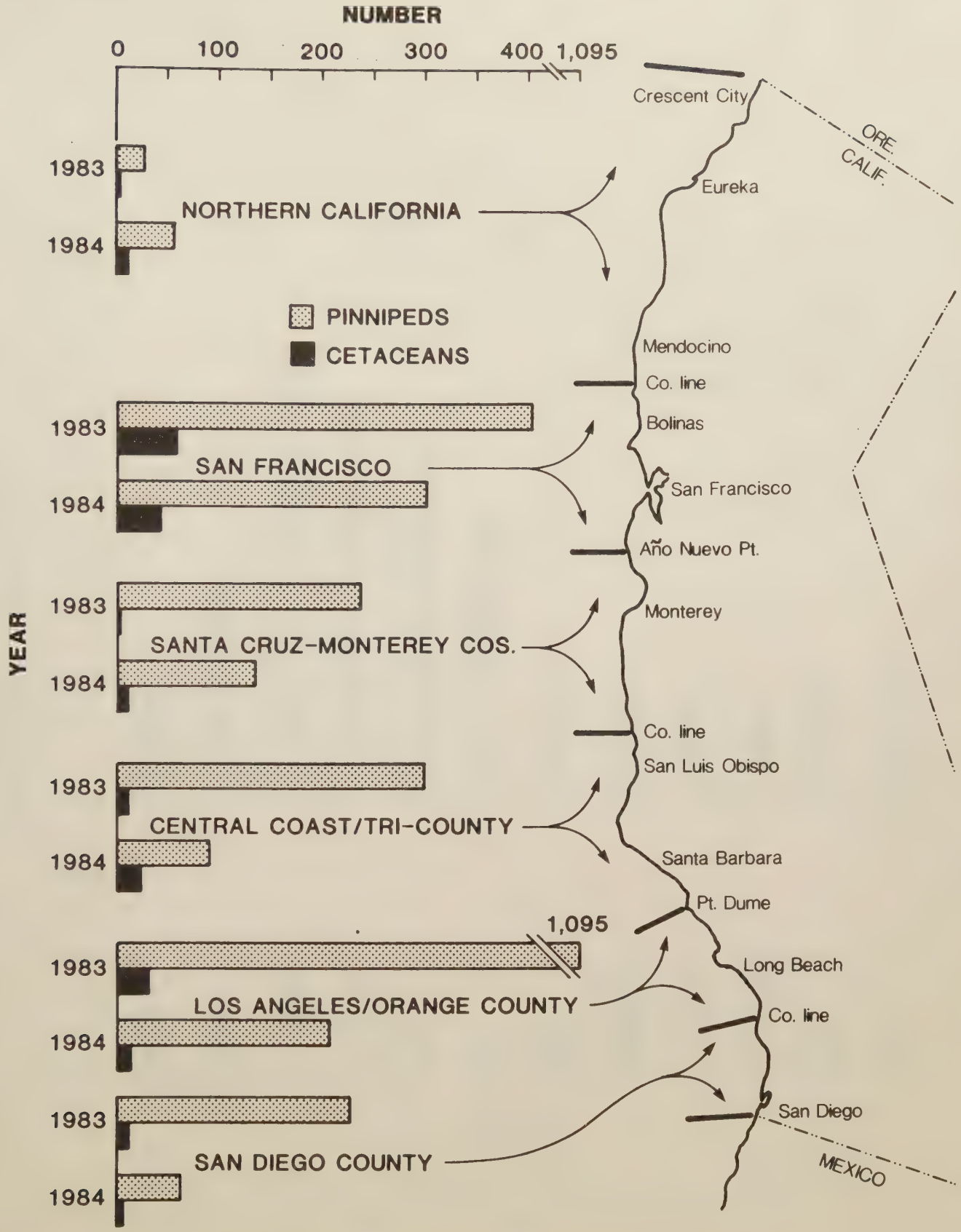

Figure 1. Total number of strandings reported to the NMFS by district (sum of county data).

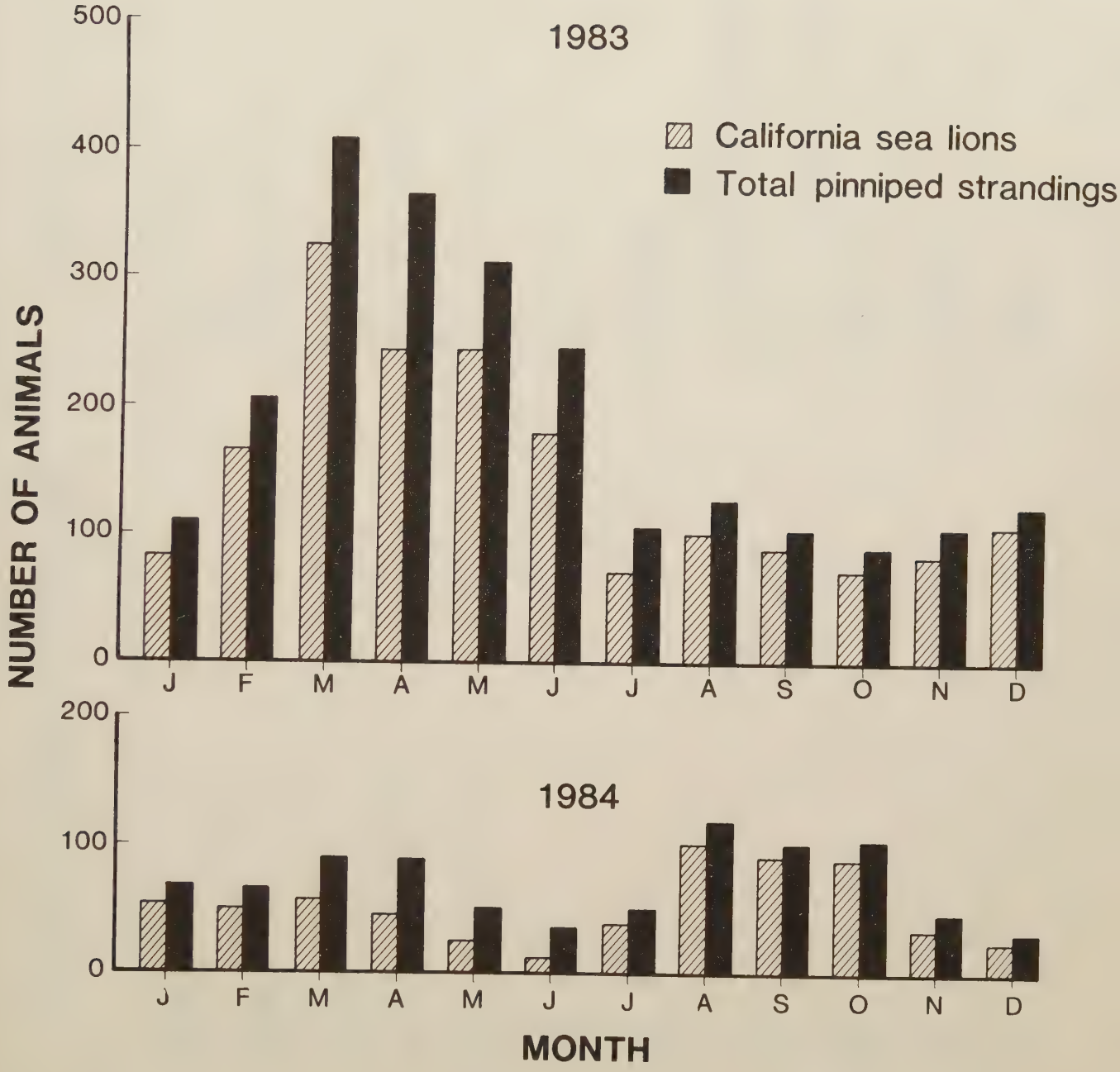

Figure 2. Total number of pinniped strandings and Zalophus californianus strandings by month for 1983 and 1984.

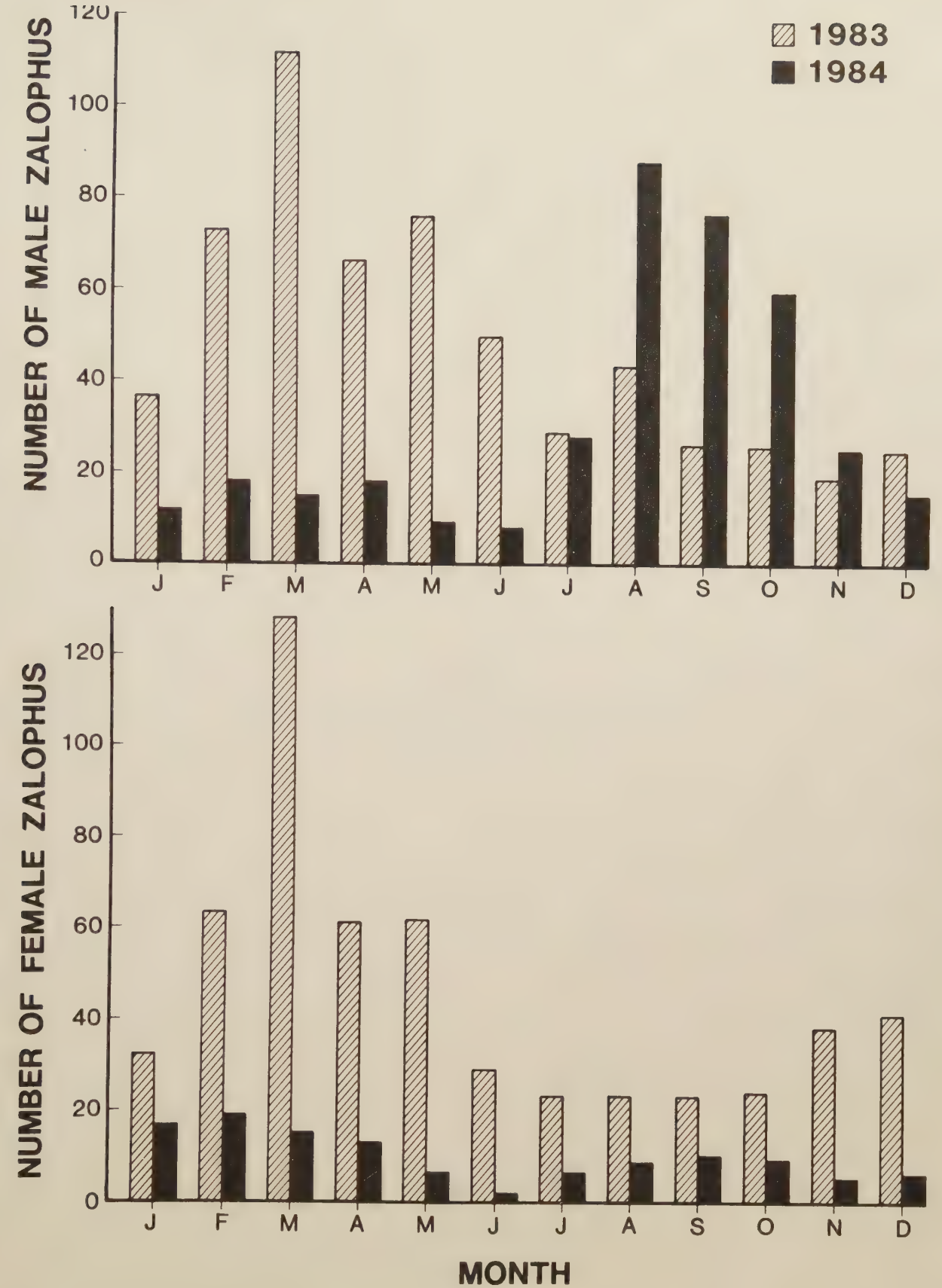

Figure 3. Male and female strandings of Zalophus californianus by month for 1983 and 1984.

APPENDIX I.
Marine Mammal Report Form Used
From About May 1974-1982

MARINE MAMMAL REPORT

ANIMAL REPORTED BY Calif. State Parks - Carpinteria State Beach

DATE 1 - 2 - 83 LOCATION Carpinteria State Beach COUNTY Santa Barbara

SPECIES: Harbor Seal (Pup). EST. AGE Less than 1 Yr. SEX Male
(estimate age of specimen maturity)

PHYSICAL CONDITION: Good - Very active and friendly - No apparent injuries.

STANDARD LENGTH approx. 2 ft. DEGREE OF CARCASS DECOMPOSITION None.

DISPOSITION OF ANIMAL AND/OR CARCASS: (Check one) Left at site _____ Buried _____
Moved to secure area _____ Returned to sea X Taken _____

If taken, indicate the following:

Circumstances requiring taking Campers at state beach constantly picked up seal and transported to ranger station; Many kids and dogs in the immediate area; transported to safety and returned to ocean waters at Arco Island(Mussel Shoals) Ventura County.

Person authorizing taking: (Name) Louis C. MORGAN #6223 (Title) Game Warden
(Agency) Calif. Dept. of Fish & Game (Telephone) (805) 684-5345

Method of Taking: net and transported by fish & game unit.

Disposition:

1. same as above Place _____ Date _____
2. _____ Place _____ Date _____
3. _____ Place _____ Date _____
Final _____ Place _____ Date _____

If animal retained, briefly describe care and maintenance: _____

Inventory/Specimen Number Assigned to Animal none

D.V.M. Consulted? No (Name) _____ (Telephone) _____

ADDITIONAL NOTES After seal pup was placed in water, it swam away towards Arco Island itself.

SIGNED L. C. Morgan #6223
TITLE Game Warden
AGENCY Dept. of Fish & Game
TELEPHONE (805) 684-5345

* *

Complete report upon receipt/observation of animal and mail as follows: CDFG
P.O. Box 475
Santa Barbara
93

Note: Samples necessary for minimum scientific use:
Cetacean–1. Stomach (1st) or Contents (2nd)
2. Ovaries or Testes
3. Section of Jaw with 6-7 teeth intact
4-5 teeth, if large species, or piece of baleen.
Pinnipeds–1. One upper canine
2. Stomach (1st) or Contents (2nd)
3. Ovaries or Testes

MMR/MLP 11/79 (Revised)

APPENDIX II.
Marine Mammal and Marine Turtle
Data Record - 1982 to Present

APPENDIX II

OMB #0648-0087
Expires March 31, 1986

MARINE MAMMAL AND MARINE TURTLE
DATA RECORD

*COMMON NAME _____

GENUS _____ SPECIES _____

*DATE OF OBSERVATION YR_____ MO_____ DAY_____ TIME_____ AM/PM
*DATE OF EXAMINATION YR._____ MO_____ DAY_____ TIME_____ AM/PM
*COUNTY _____ *TOWN OR CITY _____
LOCALITY DETAILS _____

LATITUDE/LONGITUDE _____ ° ' "N _____ ° ' "W

*TYPE OF OCCURENCE _____

*NUMBER OF ANIMALS _____
*CONDITION _____

*SEX _____

LIST TISSUES OR SKELETAL PARTS TAKEN AS VOUCHER MATERIALS: _____

PHOTOS TAKEN _____YES _____NO

LENGTH (SL)_____ CM_____ IN AGE/MATURITY _____

GIRTH _____ CM_____ IN TOT.WEIGHT_____ KG_____ LBS
*EXAMINED BY NAME _____
ADDRESS _____
AGENCY _____ PHONE ( )

SIGNATURE _____

FIELD NO. ASSIGNED TO ANIMAL _____
*DISPOSITION (Check one): Left at site ___ Moved to secure area___ Returned to sea_____
Buried___ Freezer storage___ Euthanized___ Specimen to sci. collect___ Rendering fac___
*If taken, indicate the circumstances requiring taking _____

*Location of Placement:
1. Facility _____ Date _____
2. Facility _____ Date _____
Final Disposition _____ Date _____
*If animal retained, briefly describe care and maintenance: _____

*REPORTED BY: Name _____ Title _____
ADDRESS _____ PHONE ( )
REMARKS (DISPOSITION OF VOUCHER MATERIALS): _____

*TAGS? NO_____ YES_____ NUMBER(S)_____ COLOR _____
PLACEMENT OF TAGS: _____ TYPE: _____
SPECIAL REMARKS _____

****

Complete reports upon receipt/observation of animal and mail collectively by the 10th of each month to: National Marine Fisheries Service, Southwest Region, 300 South Ferry St., Room 2011, Terminal Island, CA 90731.

Appendix II. Marine Mammal Data Record: PAGE 2

INSTRUCTION NOTES

An asterisk (*) indicates information required to be supplied to the Regional Director, National Marine Fisheries Service, Southwest Region, pursuant to 50CFR 216.22(3b).

*COMMON NAME must be the correct common name; "seal" is not acceptable. If unsure as to type of animal, note this uncertainity; use reference books to assist in ID.

LOCALITY DETAILS include the nearest named geographic feature, cape, bay, river, street address, or distance from a place, etc. Please use USGS topographic sheets, NOAA navigational charts, or maps provided in the Network Directory for place names.

LONGITUDE AND LATITUDE Should be determined as accurately as possible from marine charts.

*TYPE OF OCCURENCE includes: Sighting or stranding, single or mass strandings, human related (if shot, etc.), boat collisions, capture, incidental catch, etc.

*NUMBER is/are the number(s) of animals involved in this event.

*CONDITION should be coded as follows: 1=alive; 2=fresh dead; 2+=dead, condition unknown 3=moderately decomposed (organs still intact, but days old); 4=advanced decomposition (organs beyond recognition, carcass still intact, weeks old); 5=old carcass (skeleton remains or mummy, age indeterminate).

*SEX use "M" for male, "F" for female, "U" if unknown.

LENGTH is preferred to be taken in centimeters. If converted from feet, the original measurement should be given in REMARKS. Standard length (SL) is measured in straight line from tip of snout to tip of tail. GIRTH is measured around body immediately behind pectoral fins or foreflippers.

*EXAMINER is the person responsible for animal identification and for completing this reporting form.

*REPORTING SOURCE is the person who found the animal, not necessarily the person filling out the report (often a private citizen or local city agent).

VOUCHER MATERIALS include photos and museum or lab specimens. Give photo or catalog numbers if possible and indicate the place of disposition of these materials in REMARKS.

SPECIAL REMARKS includes any further notes on unusual circumstances, associated phenomena or animals, stomach contents, etc.

****

Samples necessary for minimum scientific use:

Cetacean-1. Stomach (freeze whole) or contents (wash thoroughly, store in ETOH only)
2. Ovaries or testes
3. Section of jaw with 6-7 teeth; 4-5 teeth, if large species; or piece of baleen.

Pinnipeds-1. One upper canine
2. Stomach (freeze) or contents (wash thoroughly, store in ETOH only)
3. Ovaries or testes

****

F S D BET ~~4000001~~ 999999

F LAST CT: ~~NOT~~ 1
NEG